Qi Heng Ho Email: qi.ho@colorado.edu

Education

2020–Present PhD in Aerospace Engineering Sciences (Autonomous Systems)
Advised by Zachary Sunberg and Morteza Lahijanian
University of Colorado Boulder

2023 M.S. in Aerospace Engineering Sciences (Autonomous Systems)
University of Colorado Boulder

2019 B.Eng Mechanical Engineering, Honours with Distinction
National University of Singapore

Appointments

2024–2025 JPL Visiting Student Researcher, NASA Jet Propulsion Laboratory, California Institute of Technology
2023–Present Young NUS Fellow, National University of Singapore
2020–Present Graduate Research Assistant, Autonomous Systems, University of Colorado Boulder
2022 Graduate Teaching Facilitator, Decision Making Under Uncertainty Course, University of Colorado Boulder
2019-2020 Research Engineer, Autonomy Group, Singapore-MIT Alliance for Research and Technology
2018 Singapore-MIT Undergraduate Research Fellow, Singapore-MIT Alliance for Research and Technology
2017 Research and Development Intern, Sivantos Group

Research Experience

2020–Present **Formal Specifications and Synthesis Techniques for Uncertain Safety-Critical Cyber-Physical Systems**
PI: Zachary Sunberg and Morteza Lahijanian

2018–2021 **Behavior, Context and Intention Aware Planning under Uncertainty for Urban Driving**
PI: Marcelo H. Ang Jr., Daniela Rus, David Hsu, and Malika Meghjani

2018 **Singapore-MIT Undergraduate Research Fellowship: Technologies of Autonomy**
PI: Daniela Rus

2018 **String stability of vehicle platoons**
PI: Johan Lofberg, Linköping University

2017 **Nanosatellite Development - Galassia 2**
PI: Luo Sha, Innovation and Design Centric Programme, National University of Singapore

Fellowships and Awards

2024	Analysis and Design of Hybrid Systems (ADHS) 2024 Travel Grant
2024	Conference on Uncertainty in Artificial Intelligence (UAI) Scholarship
2024	CU Boulder AY24/25 Graduate School Dissertation Completion Fellowship
2023–2025	NUS Development Grant (Young NUS Fellow)
2023	CU Boulder Graduate School Student Travel Grant
2020	CU Boulder Dean's Graduate Assistantship
2020	CU Boulder Aerospace Engineering Sciences Departmental Fellowship
2019	NUS Faculty of Engineering Innovation and Research Award (Silver)
2018	Singapore-MIT Undergraduate Research Fellowship
2018	NUS Awards for Studying Abroad Exchange Scholarship

Publications

Peer Reviewed Journal Articles

J1 **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Sampling-based Reactive Synthesis for Nondeterministic Hybrid Systems". In IEEE Robotics and Automation Letters (**RA-L**), 2024.

Peer Reviewed Journal-Equivalent Conference Publications (* denotes equal contribution)

Journal-equivalent conference publications have rigorous peer review of the entire article, an acceptance rate of approximately 30% or less, and are recognized to be as important as journal papers in the field.

JC2 **Qi Heng Ho**, Martin Feather, Federico Rossi, Zachary Sunberg, and Morteza Lahijanian, "Sound and Efficient Algorithms for POMDPs with Reachability Objectives via Heuristic Search". In Conf on Uncertainty in Artificial Intelligence (**UAI**), 2024 (Acceptance rate 27%).

JC1 **Qi Heng Ho**, Tyler Becker, Benjamin Kraske, Zakariya Laouar, Martin Feather, Federico Rossi, Zachary Sunberg, and Morteza Lahijanian, "Recursively-Constrained Partially Observable Markov Decision Processes". In Conf on Uncertainty in Artificial Intelligence (**UAI**), 2024 (Acceptance Rate 27%. **Oral** ($\approx$ 3% selected)).

Peer Reviewed Conference Publications (* denotes equal contribution)

Peer reviewed conference publications are selected based on peer review of the entire article, but are considered less rigorous and selective than journal-equivalent conference publications.

C11 Zakariya Laouar, **Qi Heng Ho**, Rayan Mazouz, Tyler Becker, and Zachary Sunberg, "Feasibility-Guided Safety-Aware Model Predictive Control for Jump Markov Linear Systems". In IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2024 (Acceptance rate **47.5%**).

C10 **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian. "Planning with SiMBA: Motion Planning under Uncertainty for Temporal Goals using Simplified Belief Guides". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023 (Acceptance rate **43%**).

C9 Anne Theurkauf, **Qi Heng Ho**, Roland Ilyes, Nisar Ahmed, and Morteza Lahijanian. "Chance-Constrained Motion Planning with Event-Triggered Estimation". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023 (Acceptance rate **43%**).

C8 Roland Ilyes, **Qi Heng Ho**, and Morteza Lahijanian. "Stochastic Robustness Interval for Motion Planning with Signal Temporal Logic". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023 (Acceptance rate **43%**).

C7 **Qi Heng Ho**, Roland Ilyes, Zachary Sunberg, and Morteza Lahijanian. 2023. Poster Abstract: Sampling-based Approach to Robust STL Synthesis for Complex Systems under Uncertainty. In Proceedings of the 26th ACM International Conference on Hybrid Systems: Computation and Control (**HSCC**), 2023.

C6 **Qi Heng Ho**, Roland Ilyes, Zachary Sunberg, and Morteza Lahijanian. "Automaton-Guided Control Synthesis for Signal Temporal Logic Specifications". In IEEE Conference on Decision and Control (**CDC**), 2022 (Acceptance rate $\approx$ **50**%).

C5 **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees for Chance Constrained Asymptotically Optimal Motion Planning". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2022 (Acceptance rate **43%**).

C4 Yuanfu Luo*, Malika Meghjani*, **Qi Heng Ho***, David Hsu, Daniela Rus. "Interactive Planning for Autonomous Urban Driving in Adversarial Scenarios". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2021 (Acceptance rate **48%**).

C3 Hongliang Guo, Zefan Huang, **Qi Heng Ho**, Marcelo Ang, and Daniela Rus. "Autonomous Navigation in Dynamic Environments with Multi-Modal Perception Uncertainties". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2021 (Acceptance Rate: **48%**).

C2 Malika Meghjani, Yuanfu Luo, **Qi Heng Ho**, Panpan Cai, Shashwat Verma, Daniela Rus, and David Hsu. "Context and Intention Aware Planning for Urban Driving". In IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (**IROS**), 2019 (Acceptance rate **45%**).

C1 Malika Meghjani, Shashwat Verma, You Hong Eng, **Qi Heng Ho**, Daniela Rus and Marcelo H. Ang Jr. "Context-Aware Intention and Trajectory Prediction for Urban Driving Environment". In IFRR Int. Symposium on Experimental Robotics (**ISER**), 2018.

Lightly Refereed Manuscripts

W3 **Qi Heng Ho**, Martin Feather, Federico Rossi, Morteza Lahijanian, and Zachary Sunberg, "Enhancing Online Planning and Human-in-the-Loop Control with Probabilistic Temporal Logic Shields for Partially Observable Systems", Southern California Robotics Symposium, 2024 (Selected for **Oral Presentation**).

W2 **Qi Heng Ho**, Nic Perrault, Zachary Sunberg, and Morteza Lahijanian, "LTL-Gaussian Belief Trees", International Conference on Robotics and Automation (**ICRA**) Workshop on How to Ensure Correct Robot Behaviors? Software Challenges in Formal Methods for Robotics, 2024.

W1 **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees for Probabilistic Signal Temporal Logic Planning", Robotics Science and Systems (**RSS**) Workshop on Risk Aware Decision Making: From Optimal Control to Reinforcement Learning, 2022.

Manuscripts in Preparation

J2 Nicolas Perrault, **Qi Heng Ho**, and Morteza Lahijanian, "Kino-PAX: Highly Parallel Kinodynamic Sampling-based Planner". Under Review at Robotics and Automation Letters (RA-L).

JC3 Karan Muvvala, **Qi Heng Ho**, and Morteza Lahijanian, "Beyond Winning Strategies: Admissible and Admissible Winning Strategies for Quantitative Reachability Games". Under Review at AAAI 2025.

J3 **Qi Heng Ho**, Kiril Solovey, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees: Generalizing State Space Motion Planners for Chance Constrained Motion Planning under Uncertainty". In Preparation.

J4 Ibón Gracia, **Qi Heng Ho**, Luca Laurenti, and Morteza Lahijanian, "Provably Safe Motion Planning under Uncertain Disturbances". In Preparation.

J5 Anne Theurkauf, **Qi Heng Ho**, Roland Ilyes, Nisar Ahmed, and Morteza Lahijanian, "Chance-Constrained Motion Planning with Event-Triggered Estimation", In Preparation.

Invited Talks

- National University of Singapore, Mechanical Engineering Seminar, Dec. 2023.
- NASA Jet Propulsion Lab (JPL), Maritime and Multi-Agent Autonomy, Sep. 2023.
- Georgia Institute of Technology, FACTS Lab, June 2023.

Other Talks

- University of Colorado Boulder, Robotics Summer Student Seminar, July 2022.

Students Mentored

2023-Present	Nicolas Perrault	Undergraduate & MS Student at CU Boulder (Manuscript J2).
2022-2023	Rolan Ilyes	MS Student at CU Boulder (Publications C6, C7, C8, C9). Now PhD student at Oxford Robotics Institute.
2022-2023	Kai Keller	High School Student Researcher at Boulder High School.
2018-2019	Ethan Mah	High School Student Researcher at Singapore-MIT Alliance.

Academic Service and Outreach

2023	Co-Organizer	Robotics: Science and Systems (RSS) 2023 Workshop on Inference and Decision Making for Autonomous Vehicles (IDMAV).
2024	Program Committee	International Conference on Automated Planning and Scheduling (ICAPS) '24-'25

2024	Program Committee (RE)	Hybrid Systems: Computation & Control (HSCC) '24, '25
2018-2024	Reviewer	IJRR '24, RA-L '21-'24, ICRA '20-'25, IROS '19-'24, ACC '25, ITSC '24, AAMAS '23, ISRR '22, CDC '22, AAAI FSS '22
2023	Committee Member	CU Boulder AES MS Application Review Committee
2023	Mentor	CU Boulder AES PhD Applicant Mentor
2024	STEM Outreach Speaker	CU Science Discovery and Aerospace